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RESEARCH ARTICLE

Closed reduction vs open reduction and pinning in displaced supracondylar fracture humerus in children.

Dr. Arpan Bijyal, Dr. Mohinder Singh Chib, Dr. Satvir Singh, Dr. Prince Raina, Dr. Rohit Sharma, Dr. Kanav Mahajan.

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****Corresponding Author***

Dr. Arpan Bijyal.

Abstract

Supracondylar fractures of humerus in children account for approximately 60 % of fractures in this area. The fracture line passes through the thinnest area, through the olecranon fossa posteriorly and coronoid and radial fossa anteriorly .The treatment varies according to the type of fracture. In Gartland type 1 and some selected type 2 fractures, non operative management is done with above elbow slab. In type 3 and some displaced type 2 fractures, reduction can't be achieved without internal fixation with k wires. The aim of the present study was to analyze the results of fixation of supracondylar fractures by open vs. closed reduction followed by internal fixation with k wires and assessing the union radiologically, complications associated with the procedure and restoration of range of motion and function of the elbow and to evaluate the results clinically regarding pain, stiffness, range of motion. A total of 40 cases were admitted for fracture supracondylar type 3. Out of them open reduction was done in 20 and in other 20 closed reduction was done. All 40 were fixed by internal fixation with k wires. The age of the patients in this study ranged from 4 yrs to 11 yrs. Males formed 75 %of the patients. 97.5 % fractures were extension types and the rest were flexion types. Left side was involved commonly(60 %). Duration from injury to surgery was an average of 23 hours. Mean procedure duration for closed group was 20 minutes and in open group was 70 minutes. Hospital stay in pt.s treated by closed reduction was 24 hrs(1 day). In pt.s treated by open reduction mean hospital stay was 5 days. Overall excellent results were found in 60 % in closed group and 35% in open group.

Introduction:-

Supracondylar humerus fractures in children account for 60 % cases in elbow. Incidence is more in pt.s less than 10 years and decreases drastically as the age advances.

Extension type is more common than flexion type. It is caused by fall on the outstretched hand with elbow joint in hyperextension, thus pushing the distal fragment posteriorly . Gartland type 3 and some displaced type 2 needs operative management.

Treatment methods:-

In Gartland type 1 and undisplaced type 2 fractures conservative management with above elbow cast is given .In type 3 and displaced type 2 fractures maintenance of reduction is impossible without internal fixation.

Displaced supracondylar fractures of humerus in children have always posed a challenge to the surgeons. Although the extensive literature on this fracture describes several methods of treatment ,both conservative and operative ,it would appear that operative is suitable for displaced fractures.

Aims and objectives:-
To compare results of Gartland type 3 supracondylar fracture in children treated by 2 methods-Closed reduction and pinning
Open reduction and pinning

In terms of
Stiffness and pain
Range of motion
Carrying angle
Complications

Material and methods:-

This prospective study was conducted in the post graduate department of Orthopaedics Government Medical College, Jammu during the period from 1st May 2014 to 1st May 2015.Both male and female patients were included in the study. The selection criterion was

Inclusion criteria:-
Closed Gartland type 3 fractures, both extension and flexion type

Exclusion criteria:-
Compound fractures, nerve or vessel injuries, fractures with intercondylar extension, pt.s with compartment syndrome.

All the patients were initially assessed in the emergency section of GMC Jammu. They were given first aid in the form of analgesia, splint immobilization, and other resuscitation measures. After selection of the patients for surgery, patients were prepared for surgery.

Pre-operative evaluation:-
Pre-operative evaluation included patients name, age, sex, address, date of injury, associated chronic illness. Every patient was evaluated for swelling, bruising & ecchymosis at the fracture site and visible deformity of the elbow. Closed reduction was attempted under i.v sedation to prevent neurovascular compromise due to existing deformity and to convert a severely displaced fracture to a lesser displaced or a reduced configuration. A posterior above elbow slab was applied .Check x rays done to assess reduction.
A careful neurological and vascular examination of the involved limb was done. All the routine investigations like complete blood count & biochemistry were done. Radiographic evaluation by X-ray of the chest was done in every patient. Informed and written consent was taken from the patients.

Implants:-
K wires of various diameter ranging from 1.5 to 2 mm.

Operative technique:-
20 cases were operated by closed pinning method (group 1) under short general anaesthesia and the other 20 by open pinning method (group 2) under general anaesthesia with intubation.

Group 1:-
Supine position. No tourniquet was applied. Under fluoroscopic control in supine position, closed reduction was done and elbow hyperflexed with forearm pronated to maintain reduction. Reduction confirmed under c arm before pinning. Fracture was fixed with either 2 k wires one from each condyle with an angle of 30 to 40 degrees with humeral shaft and 10 degree posteriorly or with 2 k wires from lateral condyle. In unstable fractures 2 lateral k wires were inserted. Position of k wires confirmed by c arm and remaining portion of k wire was cut and bent to avoid migration. Antiseptic dressing with posterior plaster splint given in 90 degree flexion. Check x rays done and reduction assessed using baumann angle.

Postoperatively:-
Limb elevation, i.v antibiotics, k wires removed at 3 wks and slab continued for 1 more week.pt. advised intermittent active exercises.

Group 2:-
Lateral position. Tourniquet was used in all patients. Posterior midline incision given. Fascia and triceps muscle cut in midline. Ulnar nerve identified and exposed. Fracture reduced with traction and clamps. Fixation with k wires done. Remaining end of wires cut. Stability and range of motion checked. Wound closed in layers. Dressing with above elbow slab given in 90 degree flexion.

Postoperatively:-
Limb elevation, i.v antibiotics for 5 days.asd alternate days, stitches removed on 10th day. k wires removed at 3 wks and slab continued for 1 more week.pt. advised intermittent active exercises.

Follow up:-
Follow up ranged upto 9 months. At each follow up, the following points were noted:
Clinical-range of motion, change in carrying angle, neurovascular problems, wound complications.

Radiological-xray of elbow ap and lateral view to compare carrying angle.
The final evaluation of results was done by Flynn criteria

Flynn criteria

Results	Loss of carrying angle(degree)	Loss of motion(degree)
Excellent	0-5	0-5
Good	6-10	6-10
Fair	11-15	11-15
Poor	>15	>15

Results:-
40 cases of Gartland 3 supracondylar fracture humerus were operated,20 by closed reduction(group 1) and 20 by open reduction(group 2).
The mean age group for this fracture was 7 years in both groups. Male to female ratio was 3:1.97.5% patients had extension type of fracture. Left side was involved in 70 % patients.
Majority of cases were operated within 24 hours. Procedure time in group 1 was 20 min. While in group 2 was 70 minutes (t test;p<0.0001;highly significant). Patients in group 1 were discharged on 1st day whereas in group 2 after about 5 days (t test;p<0.0001;highly significant).Stitches were removed in them on 10th day.

Grade	Group 1(n=20)		Group 2(n=20)		Total(n=40)	
	No.	%	No.	%	No.	%
Excellent	12	60.00	7	35.00	19	47.50
Good	4	20.00	5	25.00	9	22.50
Fair	2	10.00	2	10.00	4	10.00
Poor	2	10.00	6	30.00	8	20.00
Total	20	100.00	20	100.00	40	100.00

60 % excellent results were found in group 1 whereas 35 % excellent results were found in group 2.
One case each of cubitus varus was found in both groups. Wound infection was found in group 2 which required opening of stitches, thorough washing, debrided and secondary closure of wound was done.

Discussion:-
Our study included 40 cases of displaced supracondylar fractures of humerus in children which were divided in 2 groups-one treated with closed reduction and percutaneous pinning under c arm and other by open reduction and internal fixation.

On comparing this study with Holmberg in which there were 56%excellent/good result and in our study it was 80 % in group 1 and 60% in group 2.

Kurer and regan had 62.9% excellent/good results.
Gruber and Hudson had 65.3% excellent/good results.
Sharkavwi and Fattah had 72.4% excellent/good results.

Incidence of cubitus varus in our study is consistent with farnsworth et al who reported 3% after closed reduction and pinning. The results of present study is comparable with those of other series (Mehsrle and Meehan, Boyd and Aronson, Yadav et al, Sial et al.

The results with closed reduction and percutaneous pinning are better than open reduction and internal fixation method as far as range of motion of elbow is concerned.

Pre operative x ray

Post operative x ray

Post operative wound

Conclusion:-

40 patients of supra condylar fracture humerus divided equally in 2 groups managed with open/closed reduction with internal fixation.

Treatment of choice for displaced supra condylar fracture humerus in children should be closed reduction and percutaneous pinning except in conditions where open reduction is required. These are-failed attempts at closed reduction, open fracture, neurovascular compromise, late presented fractures, centers with no c arm facility.

Advantages of closed reduction and percutaneous pinning are-easy to obtain reduction under c arm, less surgical trauma to tissues, less hospital stay, no need of i.v antibiotics, less post operative stiffness, no ugly scar mark, cost effective.

This study shows that closed reduction and percutaneous pinning is treatment of choice in severely displaced supra condylar fracture humerus in children with open reduction and internal fixation having its own indications.

Bibliography:-

1. Aronson DC, van Vollenhoven E, Meeuwis JD. K-wire fixation of supracondylar humeral fractures in children: results of open reduction via a ventral approach in comparison with closed treatment. Injury 1993;24(3):179-181.

2. Boyd DW, Aronson DD. Supracondylar fractures of the humerus: a prospective study of percutaneous pinning. J Pediatr Orthop 1992;12(6):789-794.

3. Farnsworth CL, Silva PD, Mubarak SJ. Etiology of supracondylar humerus fractures. J Pediatr Orthop 1998;18(1):38-42.

4. Flynn JC, Matthews JG, Benoit RL. Blind pinning of displaced supracondylar fractures of the humerus in children. Sixteen years' experience with long-term follow-up. J Bone Joint Surg Am 1974;56(2):263-272.

5. Flynn JC, Zink WP. Fractures and dislocations of the elbow. In: MacEwan GD, Kasser JR, Heinrich SD, eds. Pediatric Fractures: A Practical Approach to Assessment and Treatment. Baltimore: Williams & Wilkins, 1993:133-164.

6. Gruber MA, Hudson OC. Supracondylar fracture of the humerus in childhood. End result study of open reduction. J Bone Joint Surg Am 1964;46:1245-1252.

7. Holmberg L. Fractures of the distal end of the humerus in children. *Acta Chir Scand (*Suppl*) 1945 : 103.*

8. Kurer MH, Regan MW. Completely displaced supracondylar fracture of the humerus in children. A review of 1708 comparable cases. Clin Orthop Relat Res 1990;256: 205-214.

9. Mehserle WL, Meehan PL. Treatment of the displaced supracondylar fracture of the humerus (type III) with closed reduction and percutaneous cross-pin fixation. J Pediatr Orthop 1991;11(6):705-711.

10. Sial NA, Yasin A and Rashid A. Supracondylar humerus fractures outcome of open reduction and percutaneous crossed pin fixation. *Prof Med J* 2011 ; **18** (1): 147-153.

11. Yadav UB, Singhal R, Tonk G, Aggarwal T and Verma AN. Crossed pin fixation in displaced supracondylar humerus fractures in children. *Traumatology* 2004; **38** : 166-169.